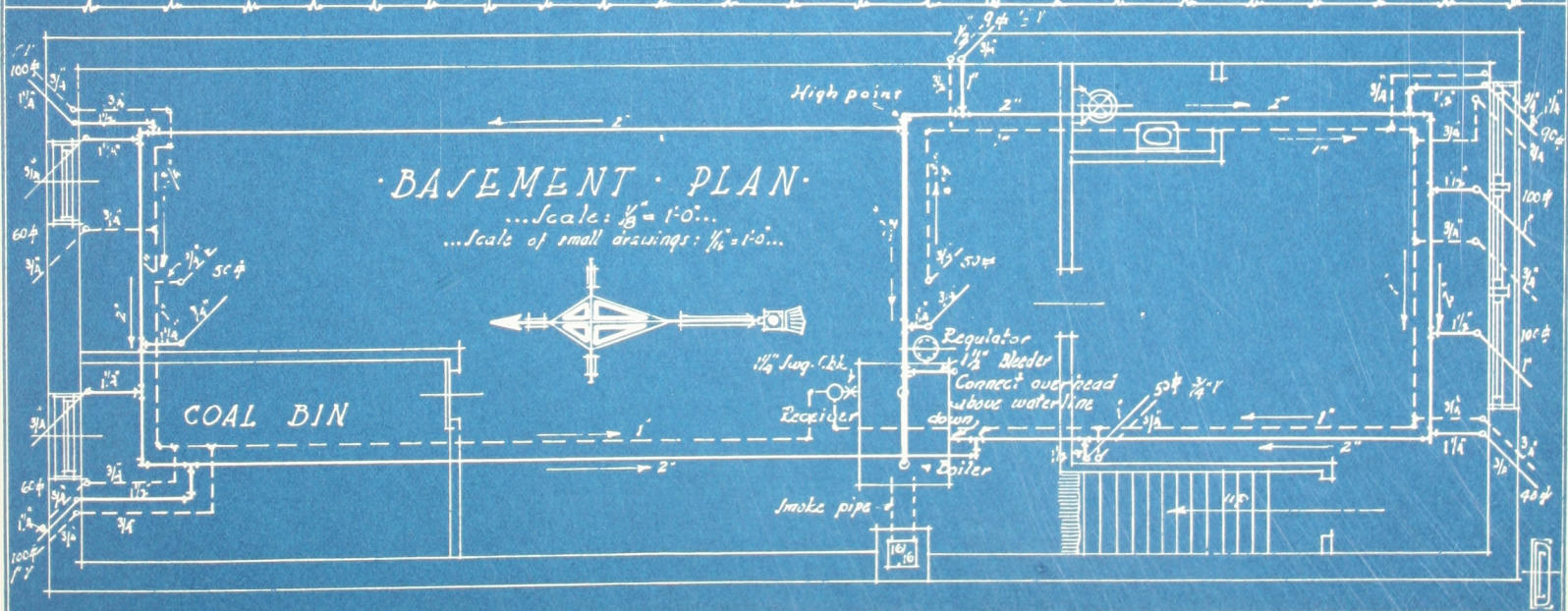
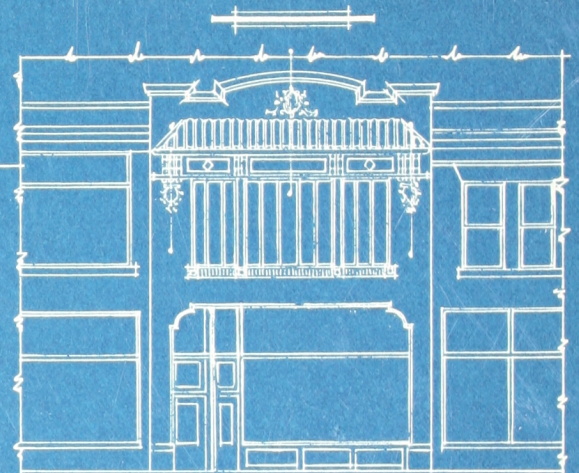
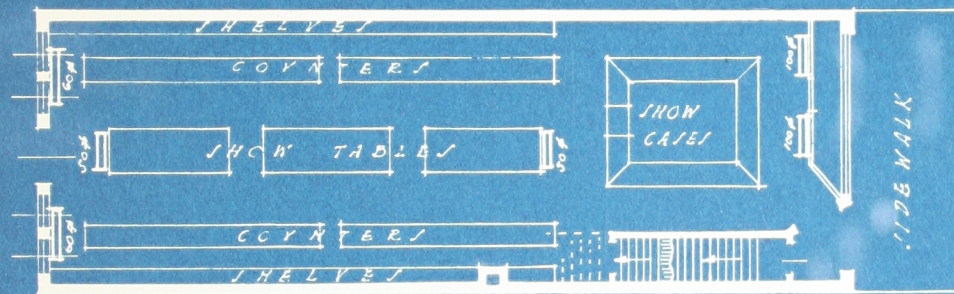


PLAN · NUMBER · FOUR ·
A · STORE · BUILDING ·
PROTECTED · ON · TWO · SIDES ·



597.3

Trane

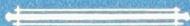
AUG 20 1919

·DATA·
·FOR·
·HEATING · ENGINEERS·
·AND·
·ARCHITECTS·
·FOR THE DESIGN OF·
·VAPOR · HEATING · SYSTEMS·

COPYRIGHTED 1917 BY
·THE · TRANE · COMPANY·
·LA · CROSSE·
·WISCONSIN·

·INTRODVCTORY·

·THE PURPOSE OF THIS BOOK IS TO PLACE IN THE HANDS OF ARCHITECTS
·AND ENGINEERS RELIABLE DATA AND INFORMATION FOR USE
·IN PLANNING AND DESIGNING VAPOR HEATING SYSTEMS.



·THE MANY ADVANTAGES OF STEAM AT ATMOSPHERIC PRESSURE
·AS A MEDIUM OF HEAT TRANSMISSION HAVE BEEN CONVINCINGLY
·DEMONSTRATED; PARTICULARLY IN THE DEVELOPMENTS OF
·RECENT YEARS; AND THE INFORMATION ON THE FOLLOWING PAGES
·IS NOT ONLY THE RESULT OF SCIENTIFIC CALCULATIONS AND
·LABORATORY TESTS ALONG THE LINES OF THE BEST ACCEPTED
·THEORIES IN HEATING ENGINEERING; BUT IS, AS WELL; THE
·DEVELOPMENT OF YEARS OF PRACTICAL EXPERIENCE WITH
·HEATING PROBLEMS OF EVERY KIND. ALL CALCULATIONS ARE BASED
·ON UNQUESTIONED HEATING AUTHORITIES; ADAPTED IN OUR OWN
·ENGINEERING DEPARTMENT TO THE PARTICULAR REQUIREMENTS
·OF VAPOR HEATING; AND THEIR CORRECTNESS AMPLY DEMONSTRATED
·IN THOUSANDS OF PRACTICAL APPLICATIONS.

·NO UNIQUE OR FREAK FEATURES HAVE EVER BEEN CLAIMED FOR TRANE
·VAPOR HEATING. IT IS SIMPLE AND DIRECT; AND ITS CONTINUED SUCCESS
·MAY BE DIRECTLY ATTRIBUTED TO THE CORRECTNESS OF THE ENGI-
·NEERING PRINCIPALS UNDERLYING; NOT ONLY THE LAYOUTS RECOM-
·MENDED FOR TRANE SYSTEMS BUT THE DESIGN AND MANUFACTURE
·OF TRANE VAPOR HEATING SPECIALTIES.

·THE TRANE COMPANY·

CHARLES H. SPECKMAN

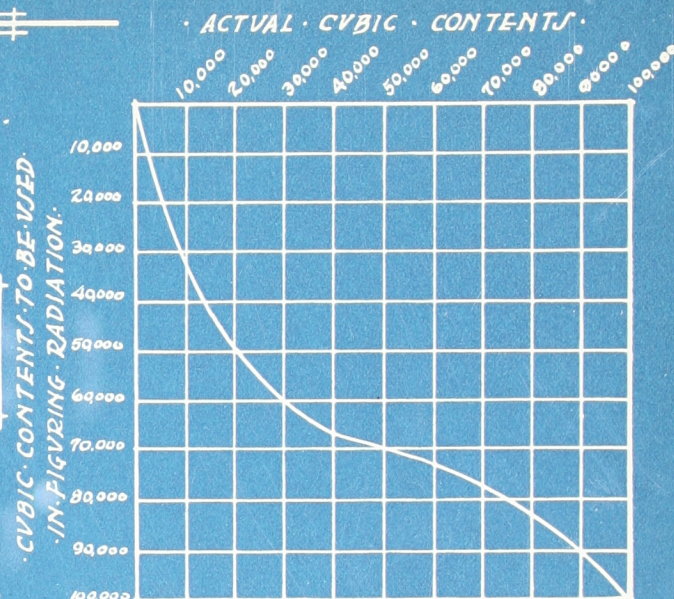
20 South Seventh Street

PHILADELPHIA, PA.

ALLOWANCES AND ADDITIONS FOR RADIATION

PERCENT OF RADIATION TO BE ADDED TO
CALCULATED AMOUNT AS FOUND IN TABLE NO. 1.

- FOR NORTH & NORTHWEST EXPOSURE: 10%.
- NORTHEAST & WEST EXPOSURE: 7%; ROOMS WITH A FIREPLACE: 10%; RADIATION UNDER SEATS: 20%.
- FLOORS & CEILINGS EXPOSED TO WEATHER TO BE FIGURED AS WALL.
- FLOORS AND CEILINGS EXPOSED TO UNHEATED ROOMS TO BE FIGURED AS $\frac{1}{2}$ WALL.
- CEILINGS IN ONE STORY COTTAGES TO BE FIGURED AS $\frac{1}{2}$ WALL.
- OPEN PRINCIPAL ROOMS WITH LARGE OPEN HALLWAY LEADING TO 2ND FLOOR ADD AT LEAST 20%.
- BATH ROOMS FIGURING 10 SQ. FT. OR LESS ADD 100%.
- LARGER BATHS SHOULD BE INCREASED 25%.
- LONG NARROW STORES EXPOSED ON NARROW ENDS ONLY WITH 2ND FLOOR HEATED FIGURE $\frac{1}{2}$ CONTENTS.
- LONG NARROW STORES EXPOSED ON 3 OR 4 SIDES; DOUBLE CONTENTS.
- SCHOOL ROOMS NOT VENTILATED DOUBLE CONTENTS.
- WHEN DIRECT INDIRECT IS USED ADD 35%.
- WHEN INDIRECT IS USED ADD AT LEAST 75%.
- FOR CHURCHES FIGURE ENTIRE ROOF AS WALL.
- FIGURE CONTENTS & USE CHART TO OBTAIN CONTENTS TO BE FIGURED FROM ACTUAL CONTENTS.
- CHART SHOWS THAT CONTENTS SHOULD BE INCREASED IN ALL CHURCHES WITH LESS THAN 90,000 Cu Ft.
- EX. - IN A CHURCH WITH 30,000 Cu Ft. USE 60,000 Cu Ft. AS CONTENTS TO BE FIGURED.



EXAMPLES FOR USING TABLES
NO. 1, 2 AND ADDITIONS.

1. FIND RADIATION REQUIRED FOR A N.W. ROOM TO BE HEATED TO 70° AT 10° BELOW ZERO. CONTENTS - 1440 Cu. Ft., GLASS 60 SQ. FT. WALL - 200 SQ. FT.

SEE TABLE NO. 1 - COLUMN HEADED (-10)

$$\frac{1440}{158} = 9.12 \quad \frac{200}{9.3} = 21.5 \quad \frac{60}{2.80} = 20.82$$

$$9.12 + 21.5 + 20.82 = 51.44$$

ADD 10% FOR N.W. EXPOSURE.

$$51.44 + 5.144 = 56.58 \text{ or } 57 \text{ sq. ft.}$$

2. FIND RADIATION TO HEAT ABOVE ROOM TO 80° AT 10° BELOW ZERO.

WE FOUND 57 SQ. FT. REQUIRED FOR 70° IN TABLE NO. 2 IN COLUMN HEADED (-10) OPPOSITE (80°), WE FIND 1.21.

$$57 \times 1.21 = 69 \text{ sq. ft. REQUIRED.}$$

SUPPLY PIPE SIZES

FIRST DETERMINE THE TOTAL LENGTH OF MAIN SUPPLY PIPE; ADDING TO THIS LENGTH ADDITIONS FOR 90° AND 45° ELBOWS AND TEES AS IN TABLE NO. 1. COUNT ONLY THE TEES USED ON BEGINNING OF SEPARATE SUPPLY CIRCUITS.

TABLE 1

PIPE SIZE	LENGTH OF PIPE EQUIVALENT TO RESISTANCE											
	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6	7	8
90° ELBOW & TEE	3	3	5	6	8	10	13	16	19	23	29	33
45° ELBOW	2	2	3	3	4	5	6	8	10	13	15	17

AFTER DETERMINING THE TOTAL LENGTH WITH ADDITIONS, THE SIZE TO BE USED IS FOUND BY USING TABLE NUMBER 2.

TABLE 2

SQUARE FEET OF RADIATION	MAXIMUM LENGTH OF MAIN IN FEET INCLUDING ADDITIONS FOR FITTINGS (SEE TABLE NO. 1)									
	20'	30'	40'	60'	80'	100'	200'	400'	800'	1500'
	MAIN SIZES									
60	1 1/4"	1 1/4"	1 1/4"	1 1/4"	1 1/2"	1 1/2"	2"	2"	2"	2 1/2"
100	1 1/4"	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"	2 1/2"	2 1/2"
200	1 1/2"	1 1/2"	1 1/2"	1 1/2"	2"	2"	2"	2 1/2"	2 1/2"	2 1/2"
300	1 1/2"	1 1/2"	2"	2"	2"	2 1/2"	2 1/2"	2 1/2"	3"	3"
400	1 1/2"	2"	2"	2"	2 1/2"	2 1/2"	2 1/2"	2 1/2"	3"	3"
600	2"	2 1/2"	2 1/2"	2 1/2"	3"	3"	3"	3"	3"	3 1/2"
800	2 1/2"	2 1/2"	3"	3"	3"	3"	3"	3 1/2"	3 1/2"	4"
1000	3"	3"	3"	3"	3"	3 1/2"	3 1/2"	4"	4"	4"
1500	3"	3"	3"	3 1/2"	3 1/2"	4"	4"	4"	4 1/2"	4 1/2"
1600	3 1/2"	3 1/2"	3 1/2"	4"	4"	4"	4 1/2"	4 1/2"	4 1/2"	5"
2000	4"	4"	4"	4"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	5"	5"
2500	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	4 1/2"	5"	5"	6"
3000	4 1/2"	4 1/2"	4 1/2"	5"	5"	5"	5"	6"	6"	6"
3500	5"	5"	5"	5"	5"	6"	6"	7"	7"	7"
4000	5"	6"	6"	6"	6"	6"	7"	7"	7"	7"
4500	6"	6"	6"	6"	6"	7"	7"	7"	7"	8"
5000	6"	6"	6"	6"	7"	7"	7"	7"	8"	8"
6000	6"	6"	7"	7"	7"	7"	7"	8"	8"	9"
8000	7"	7"	7"	7"	7"	8"	8"	8"	9"	9"
10,000	7"	7"	8"	8"	8"	9"	9"	9"	9"	10"

EXAMPLE: - TAKE 2500# OF RADIATION; LENGTH OF MAIN BEING 100 FEET WITH 3 - 90° AND 2 - 45° ELBOWS. USING TABLE NO. 2 WE FIND THAT 4 1/2" OR 5" ARE TO BE USED. IF 4 1/2" ADD FOR ELBOWS 64 FEET OR A TOTAL OF 164 FEET. BY AGAIN USING TABLE NO. 2 WE FIND 4 1/2" TO BE THE CORRECT SIZE OF MAIN TO USE.

RETURN MAINS

RADIATION	SQUARE FEET		SIZE
0-100	"	"	3/4 INCH
100-400	"	"	1 "
400-1200	"	"	1 1/2 "
1200-1800	"	"	1 1/2 "
1800-2500	"	"	2 "

· RISER · SIZES ·

· ESTIMATE LENGTH OF MAIN FROM BOILER TO EACH RISER; USING TABLE NO. 1 FOR ADDITIONS AND SELECT RISER FROM THAT COLUMN OF TABLE NO. 3 CORRESPONDING TO ESTIMATED LENGTH OF MAIN. RISER MAY BE REDUCED AS RADIATION IS TAKEN OFF (SEE SAME COLUMN) . . .

· TABLE · 3 ·

· SQUARE · FT. · OF · · RADIATION ·	· MAXIMUM LENGTH OF MAIN IN FEET INCLUDING ADDITIONS · · FOR · FITTINGS · (SEE TABLE NO. 1) ·														
	10	20	30	40	50	60	70	80	90	100	150	200	400	800	
	· RISER SIZES ABOVE FIRST FLOOR ·														
20	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	3/4"	1"	1"	1"	1"	1"	1"	1"	
35	3/4"	3/4	3/4	3/4	3/4	3/4	1	1	1	1	1	1 1/4	1 1/4	1 1/4	
45	3/4	3/4	3/4	1	1	1	1	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4	
55	1	1	1	1	1	1	1	1	1 1/2	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	
80	1	1	1	1	1	1	1 1/2	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	
99	1	1	1	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	2	
110	1	1	1	1	1 1/2	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	2	2	2	
150	1	1	1 1/4	1 1/4	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2 1/2	
200	1 1/4	1 1/4	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2 1/2	2 1/2	2 1/2	
300	1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	2	2	2	2	2	2 1/2	2 1/2	2 1/2	3	
400	2	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3	
500	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3	3	
600	2	2	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3	3	3 1/2	
700	2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3	3	3 1/2	3 1/2	
800	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3	3	3 1/2	3 1/2	3 1/2	
900	2 1/2	2 1/2	2 1/2	2 1/2	2 1/2	3	3	3	3	3	3 1/2	3 1/2	3 1/2	3 1/2	
1000	2 1/2	2 1/2	2 1/2	3	3	3	3	3	3	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	

· RETURN · RISERS ·

RADIATION	SIZE
0-100 · SQUARE · FEET ·	3/4" INCH
100-300 " "	1" "
300-600 " "	1 1/4" "
600-1200 " "	1 1/2" "

· REDUCTIONS MAY BE MADE ACCORDING TO TABLE AS RADIATION IS TAKEN OFF ·

· LATERALS OR SUPPLY ARMS ·

· 3/4" AND 1" RISERS TAKE SUPPLY ARMS TWO SIZES LARGER · LARGER RISERS TO BE INCREASED · ONE · SIZE · · NB: STUBS FOR FIRST FLOOR RADIATORS TO BE SAME SIZE AS VALVES EXCEPT WHERE · RADIATORS ARE 109 SQ. FT. OR OVER AND REQUIRE 1 1/4" OR LARGER STUB ACCORDING TO TABLE NO. 3 · SUCH RADIATORS TO HAVE 1 1/4" STUB AND A REDUCER AT THE 1" VALVE ·

·HOW ·TO ·SELECT ·BOILER ·SIZE ·

·ROUND ·BOILERS ·

·TO ·BE ·ABSOLUTELY ·LIBERAL ·ON ·ROUND ·CAST ·IRON ·BOILERS ·, ADD · 20 % ·
·FOR ·HEAT ·LOSS ·IN ·PIPING ·AND ·40-50 % ·OF ·THE ·SUM ·FOR ·EXCESS ·
·SELECT ·LOWEST ·BOILER ·IN ·A ·SERIES ·FOR ·SOFT ·COAL ·AND ·A ·LOW ·CHIMNEY ·
·WITH ·A ·35-40 ·FOOT ·CHIMNEY ·THE ·SECOND ·IN ·THE ·SERIES ·MAY ·BE ·USED ·
·FOR ·HARD ·COAL ·, THE ·SECOND ·IN ·THE ·SERIES ·IS ·GOOD ·, THE ·HIGHEST ·IN ·
·THE ·SERIES ·IS ·ONLY ·GOOD ·FOR ·ESPECIALLY ·HIGH ·CHIMNEYS ·.

·SQUARE ·BOILERS ·

·AVOID ·LONG ·BOILERS ·. SOFT ·COAL ·IS ·USUALLY ·BURNED ·IN ·SQUARE ·BOILERS ·.
·HENCE ·IT ·IS ·WELL ·TO ·BE ·A ·LITTLE ·MORE ·LIBERAL ·WITH ·THE ·SIZE ·.

·STEEL ·BOILERS ·

·FIRE BOX ·BOILERS ·ARE ·RATED ·TO ·CARRY ·THEIR ·ACTUAL ·RADIATING ·
·SURFACE ·AND ·IN ·SELECTING ·THE ·SIZE ·25-30 % ·EXCESS ·IS ·SUFFICIENT ·.

·DOWNDRAFT ·BOILERS ·

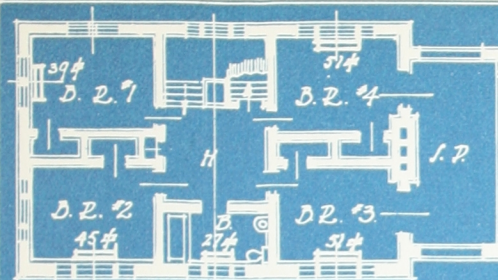
·SPECIAL ·ATTENTION ·MUST ·BE ·PAID ·TO ·HEIGHT ·AND ·SIZE ·OF ·CHIMNEY ·.
·USE ·MANUFACTURER'S ·RECOMMENDATIONS ·.

·CHIMNEYS ·

·USE ·MANUFACTURER'S ·SIZES ·. MANY ·RESIDENCES ·ARE ·SPOILED ·BY ·6"X12" ·
·FLUES ·. ORDINARY ·8-10 ·ROOM ·HOUSES ·REQUIRE ·12"X12" ·FLUES ·.

·A ·METHOD ·FOR ·SELECTING ·THE ·PROPER ·LAYOUT ·

·MOST ·ALL ·INSTALLATIONS ·CAN ·BE ·CORRECTLY ·DESIGNED ·ACCORDING ·
·TO ·ONE ·OF ·THE ·TWO ·GENERAL ·PLANS ·, DEPENDING ·UPON ·THE ·LOCATION ·
·OF ·THE ·BOILER ·WITH ·REFERENCE ·TO ·THE ·PRINCIPAL ·EXPOSURES ·AS ·
·SHOWN ·ON ·PLANS ·ONE ·AND ·TWO ·.

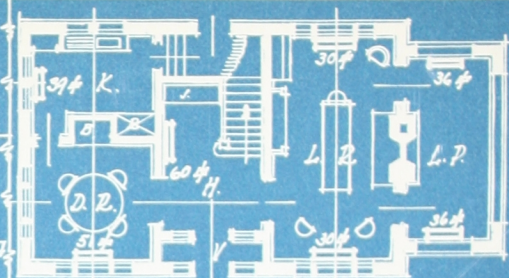


·SECOND·FLOOR·PLAN·

...scale: $\frac{1}{16}'' = 1'-0''$...

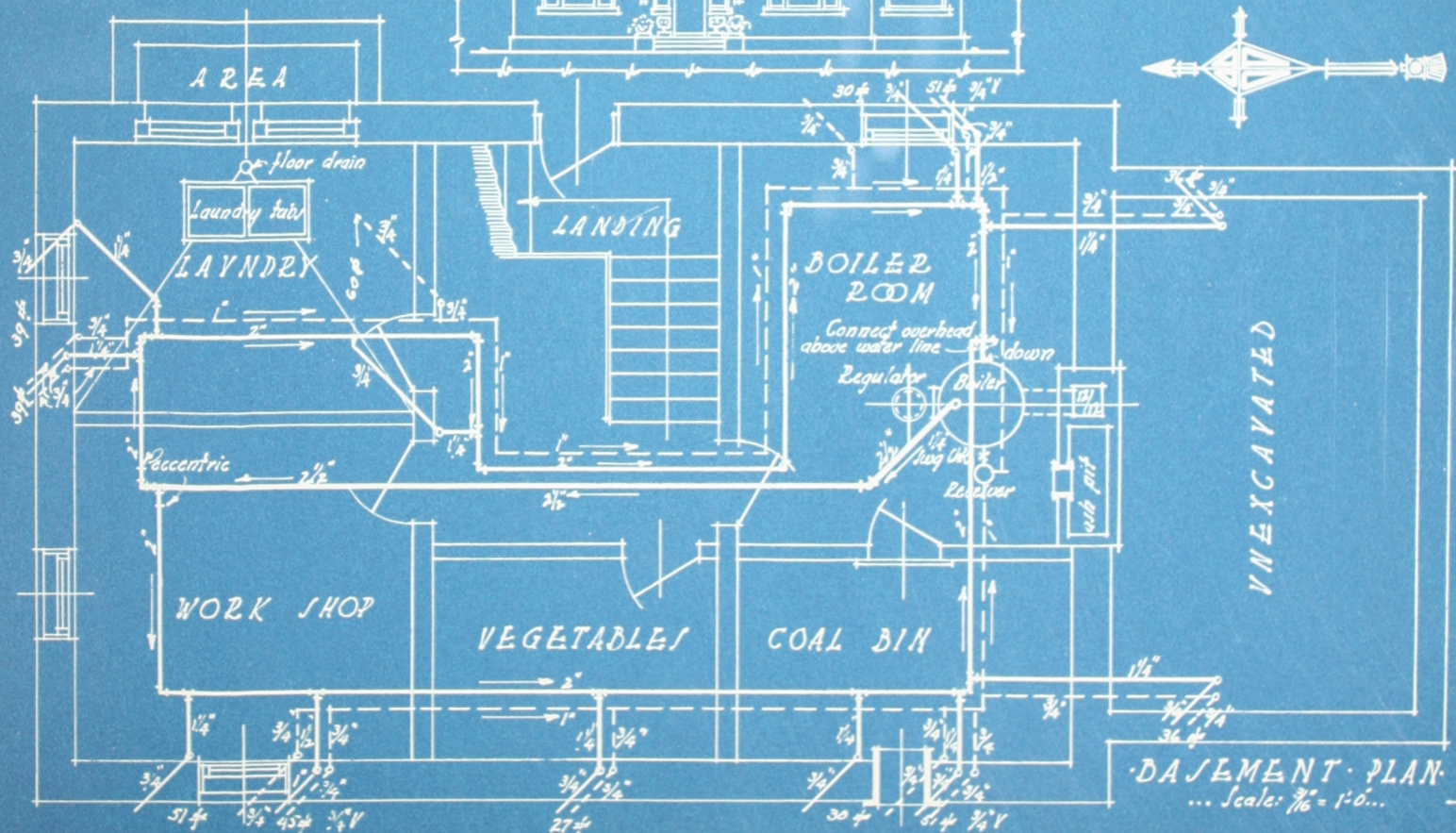


·BOILER·IN·THE·SOVTH·OR·
·VNXPOSED·PART·OF·HOVSE·



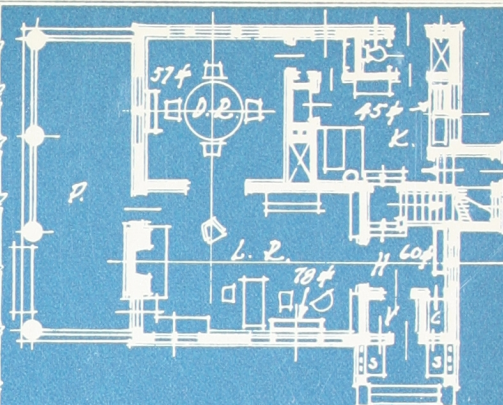
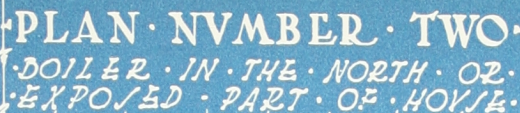
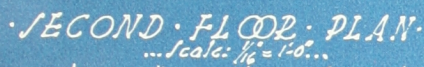
FIRST FLOOR PLAN.

...Scale: $\frac{1}{4}'' = 1'-0''$...

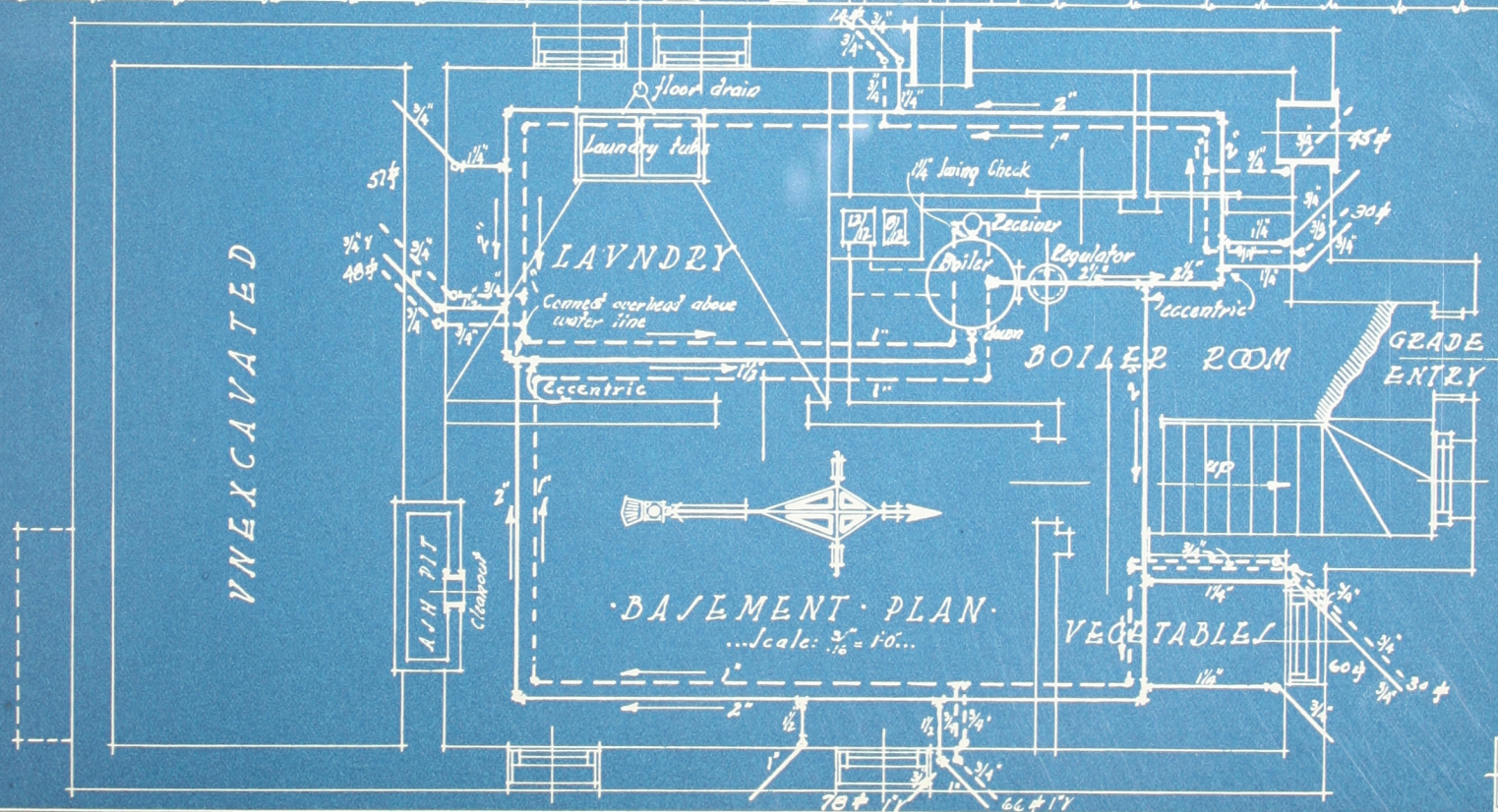


BASLEMENT PLAN

... Scale: $\frac{3}{16}'' = 1'-0''$...

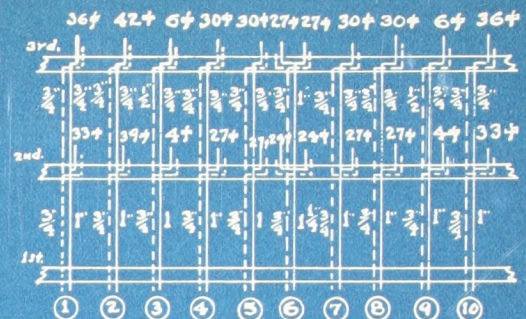


FIRST FLOOR PLAN
...Scale: $\frac{1}{8}" = 1'-0"$...



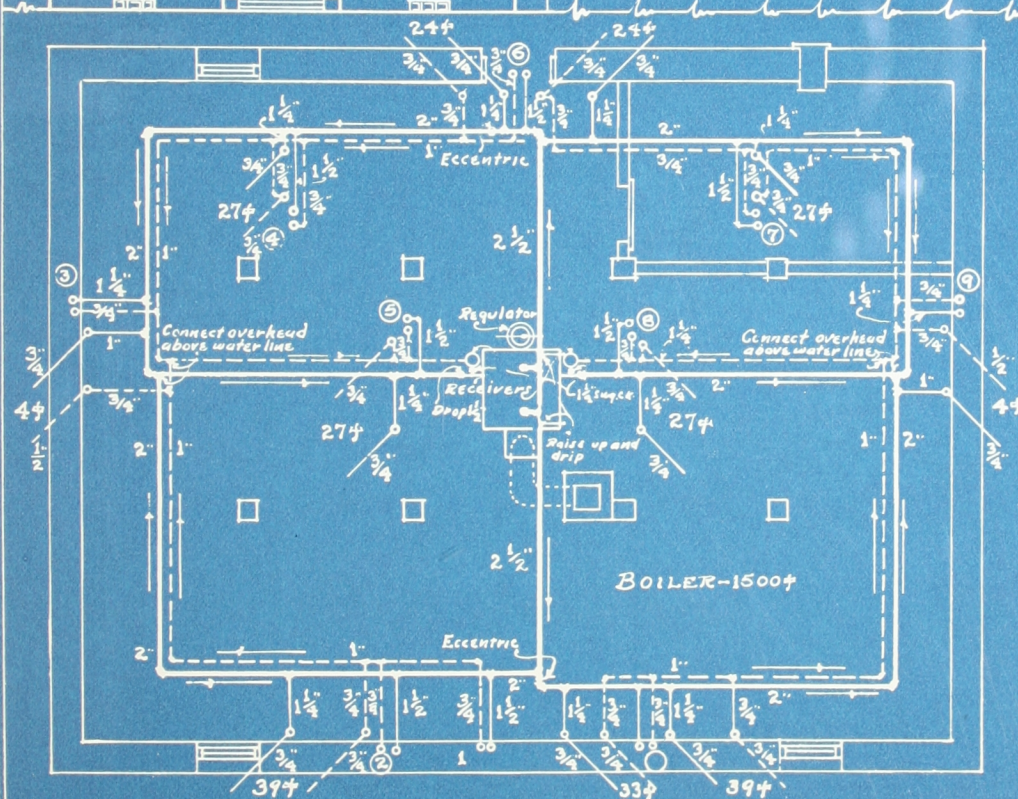
PLAN · NUMBER · THREE ·
AN APARTMENT · BLDG ·

NOTE · THAT · THIS · IS · A · COMBI-
NATION · OF · TWO · LAYOVTS ·
LIKE · PLAN · NUMBER · TWO ·



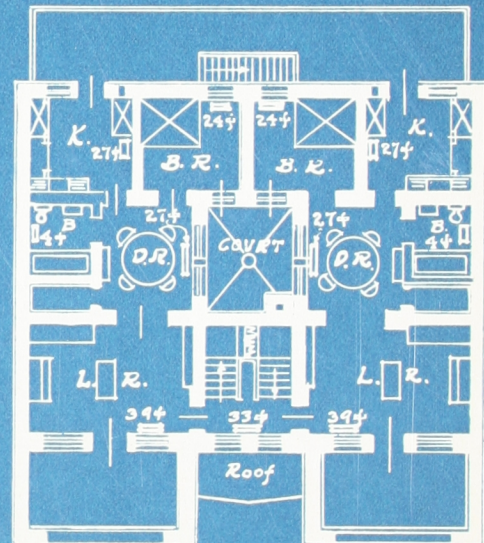
RISER · DIAGRAM.

.. Scale: $\frac{1}{16}'' = 1' 0''$.



· BASEMENT · PLAN ·

...Scale: $\frac{1}{8}'' = 1'0''$...

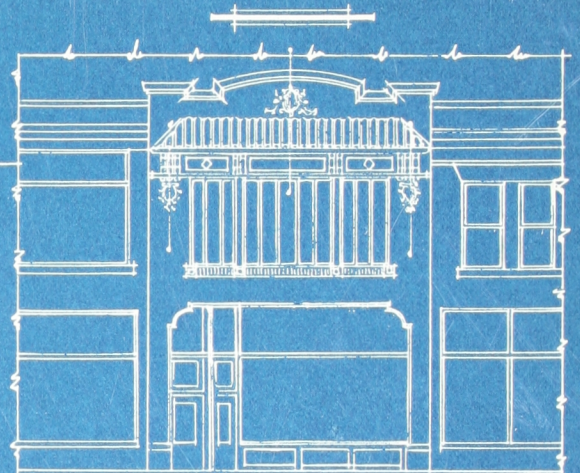
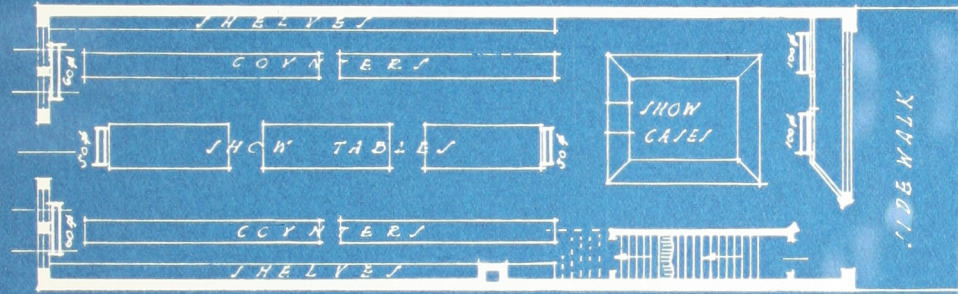
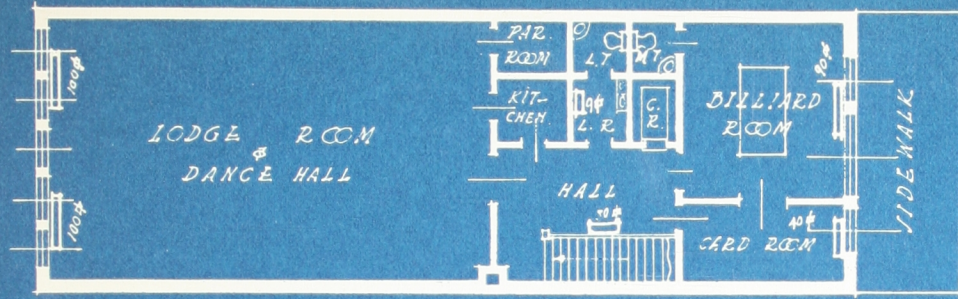


• SECOND FLOOR PLAN.

...Scale: $\frac{1}{16}'' = 1'0''$...



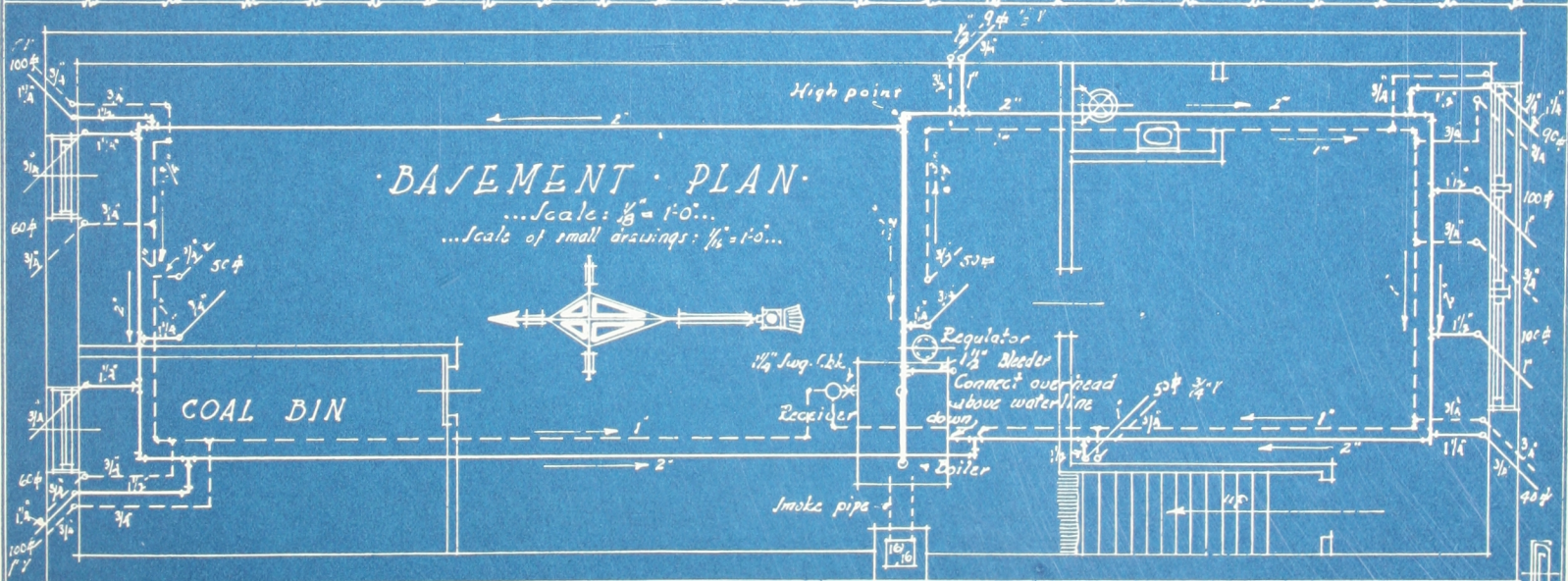
PLAN · NUMBER · FOUR ·
A · STORE · BUILDING ·
PROTECTED · ON · TWO · SIDES ·



· BASEMENT · PLAN ·

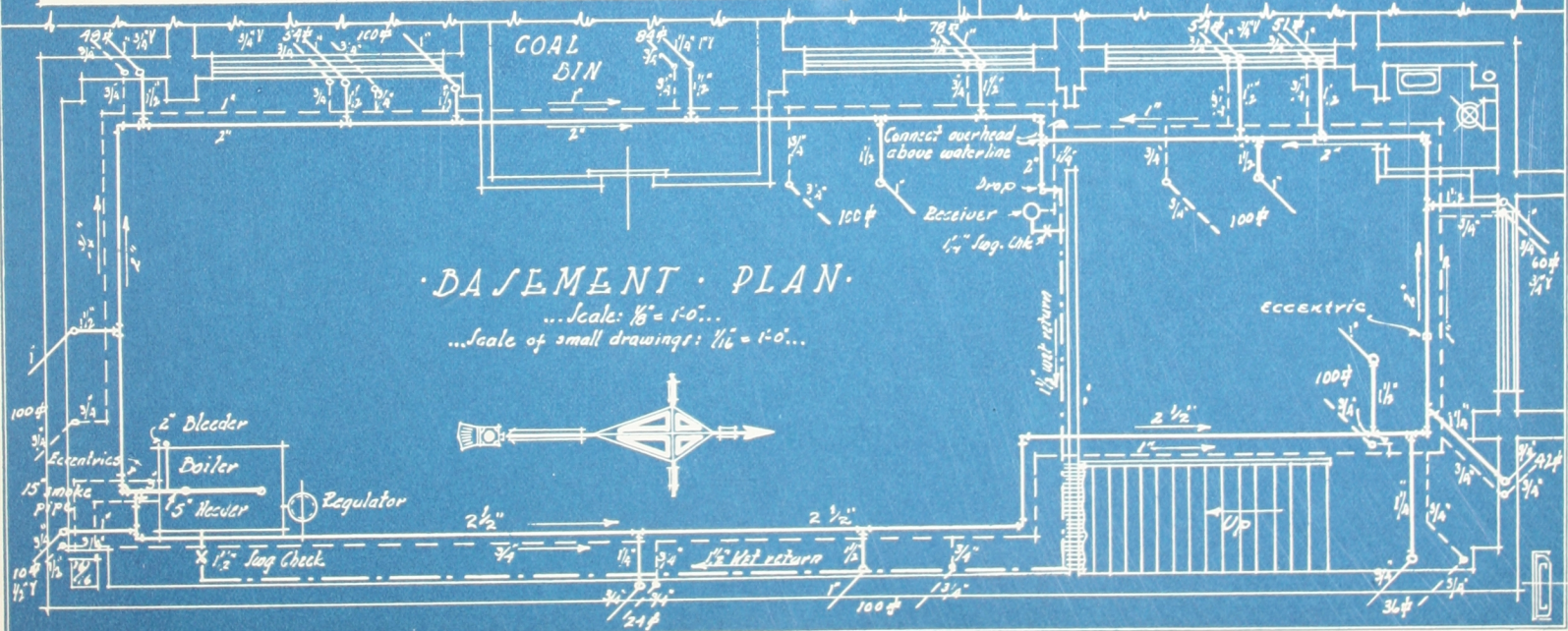
...Scale: $\frac{1}{8}$ " = 1'-0"

...Scale of small drawings: $\frac{1}{16}$ " = 1'-0"



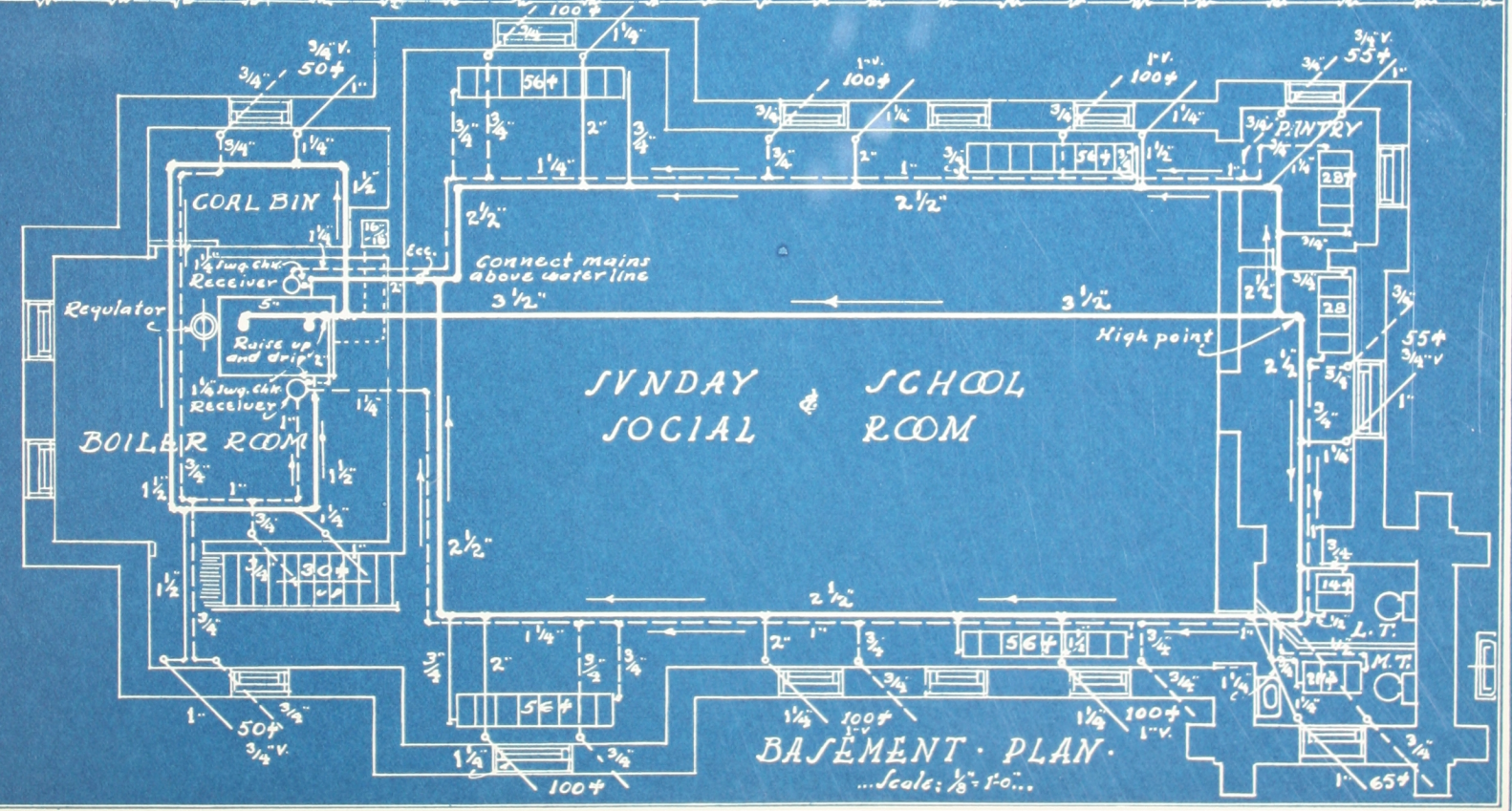
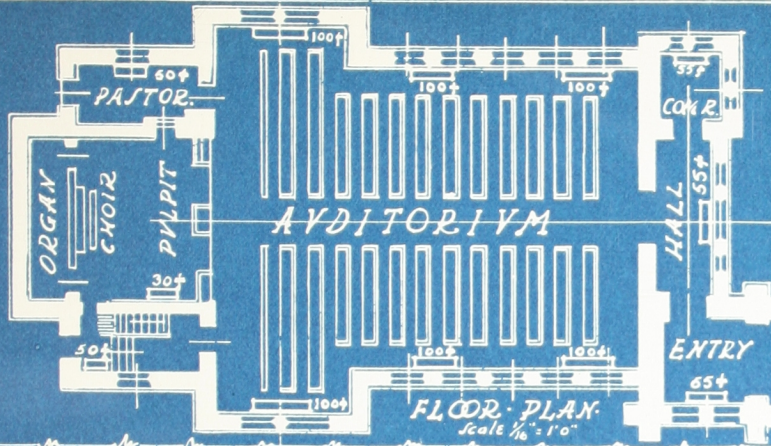
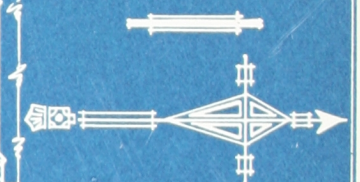


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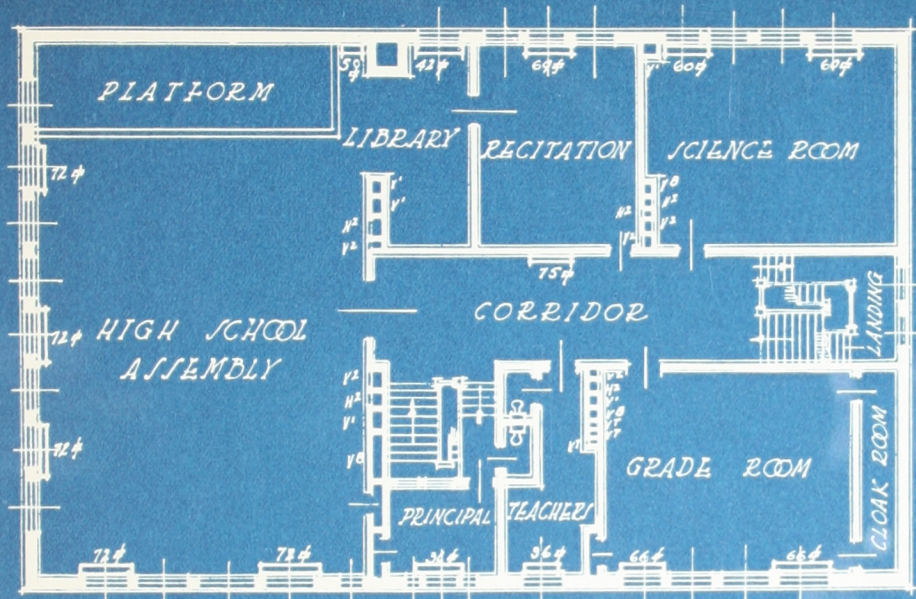
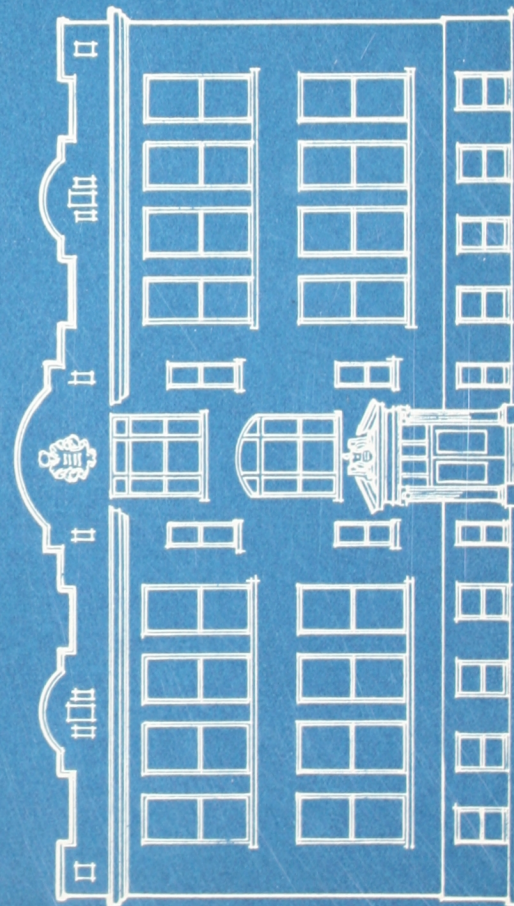
PLAN · NO · SIX A · CHVRCH

NOTE · THE · W.E. OF ·
THREE · CIRCVITS ·
IN · THIS · LAYVT ·

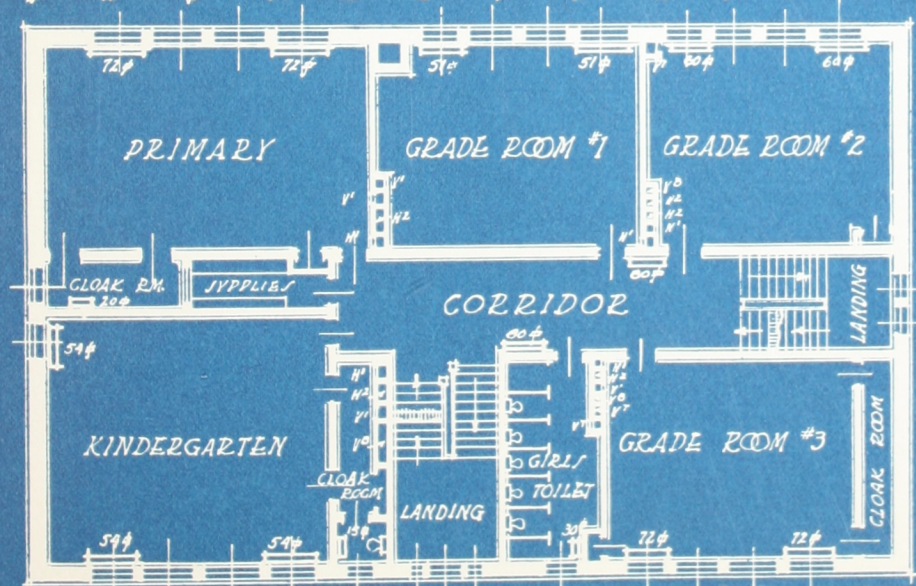


SHEET NUMBER ONE
 PLAN NUMBER SEVEN
 A SCHOOL BUILDING

SHOWING THE USE OF A FAN
 SYSTEM IN COMBINATION
 WITH DIRECT RADIATION
 REDRAWN FROM AN INSTALLATION



SECOND FLOOR PLAN

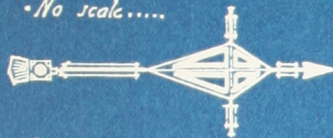


FIRST FLOOR PLAN

Scale for all drawings on
 this sheet: $\frac{1}{8}'' = 1'-0''$

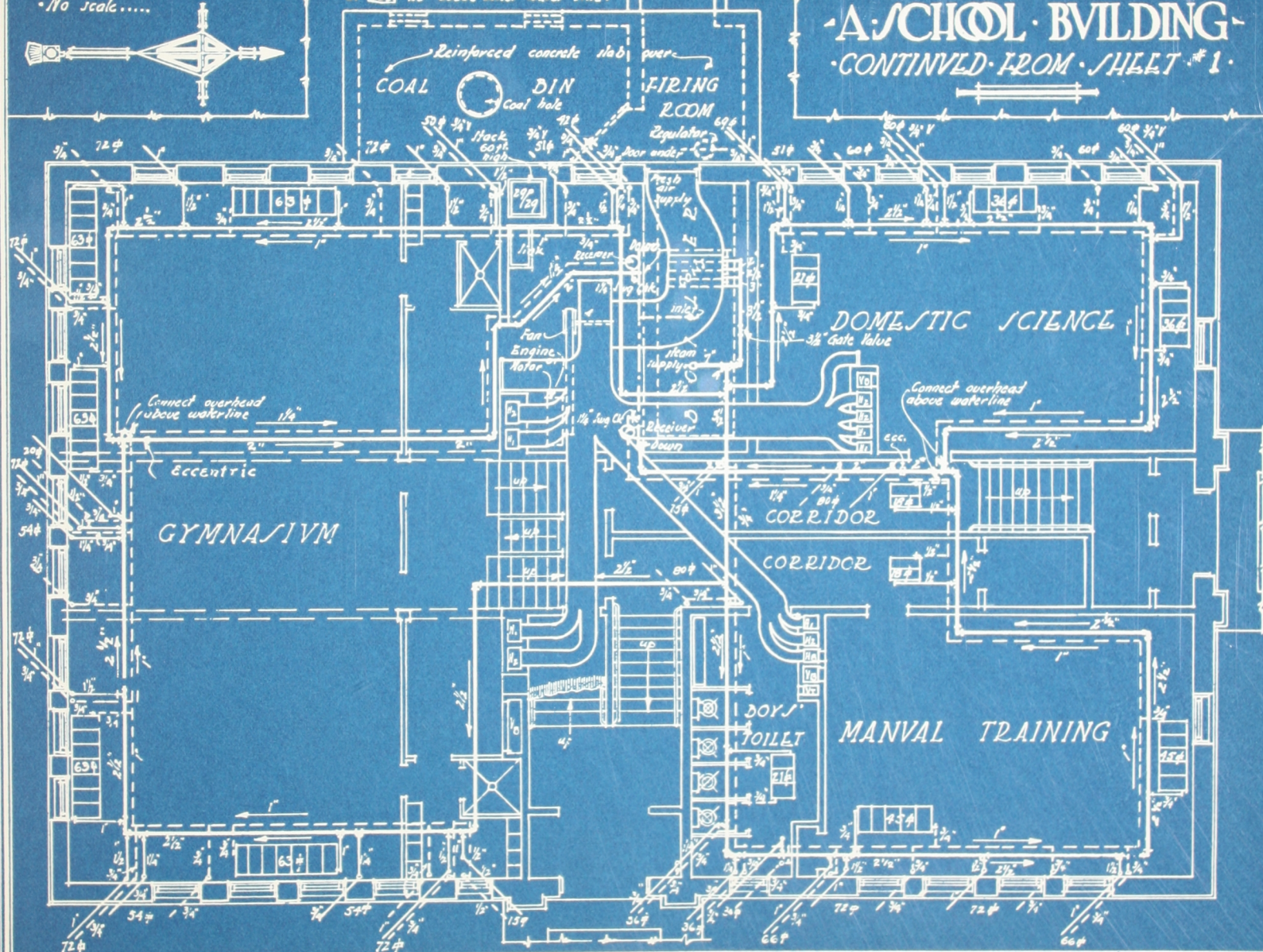
For Basement Plan
see following sheet...

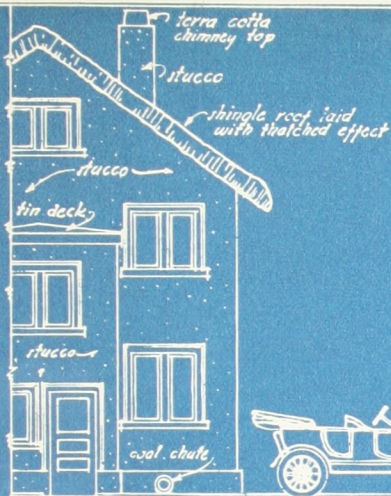
• No scale.....



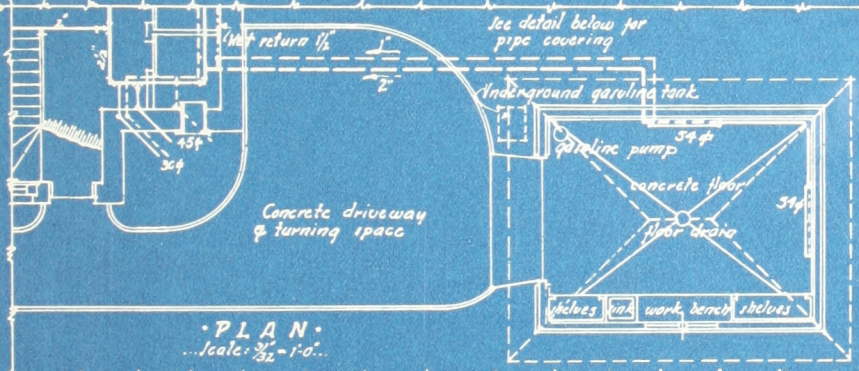
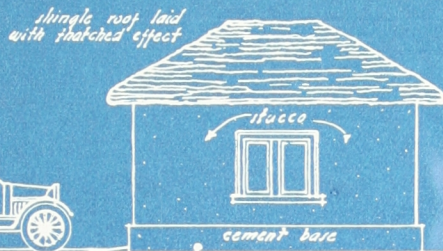
Pitch all pipes down in direction of arrows. Top of receivers should be at least 20" above boiler water line.

SHEET NUMBER TWO
-PLAN · NUMBER · SEVEN-
-A · SCHOOL · BUILDING-
-CONTINUED · FROM · SHEET #1-

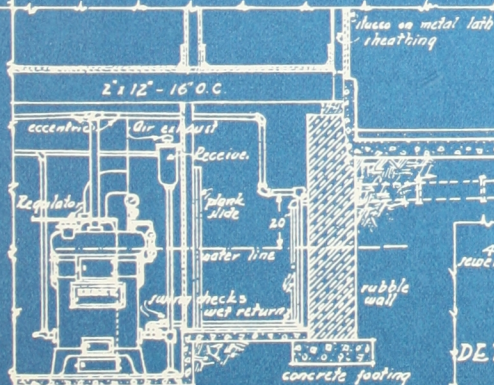




ELEVATION · SHOWING ·
GARAGE · IN · CONNECTION ·
WITH · RESIDENCE · SHOWN ·
ON · SHEET · NUMBER · FOUR ·
... Scale: $\frac{1}{32} = 1'-0''$...



PLAN ·
... Scale: $\frac{1}{32} = 1'-0''$...

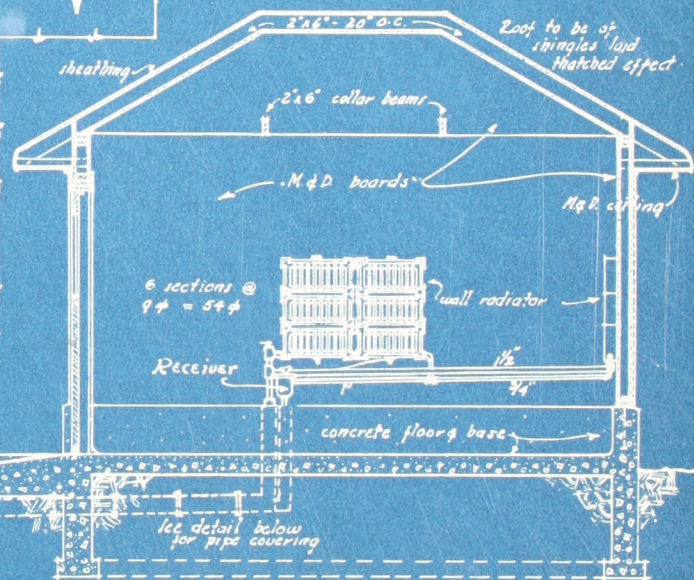
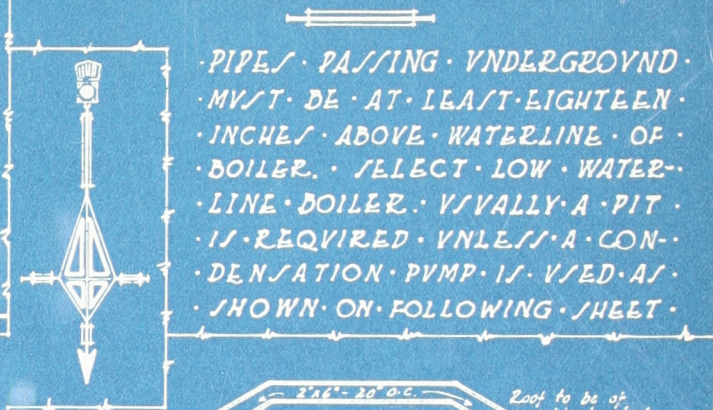


SECTION ·
... Scale: $\frac{1}{16} = 1'-0''$...



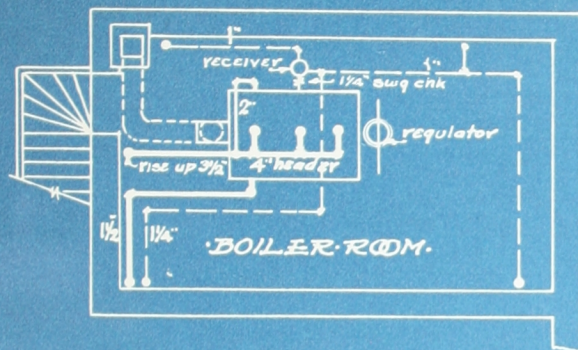
DETAIL OF PIPE COVERING
... Scale: $\frac{1}{8} = 1'-0''$...

PLAN · NUMBER · EIGHT ·
A · DISCONNECTED · GARAGE ·
· SEE · ALSO · PLAN · NUMBER · TWO · SHEET · FOUR ·

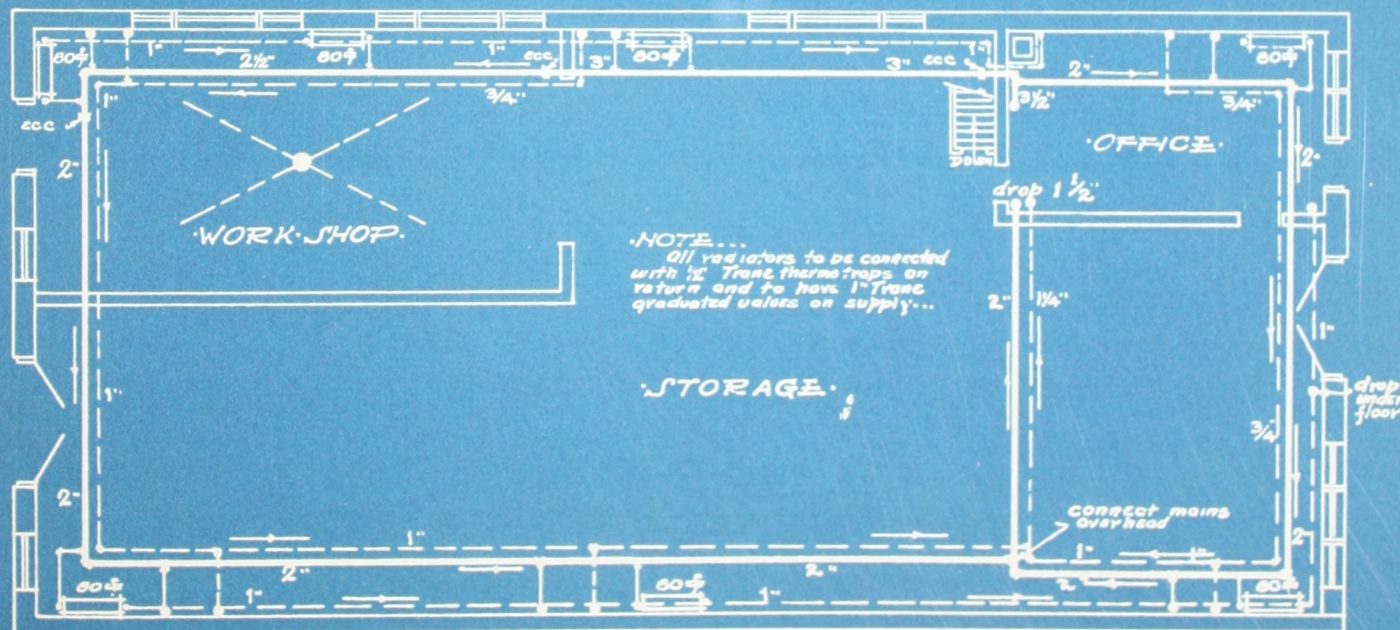
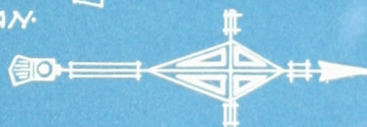


WHERE GARAGE IS MORE THAN 35 FT. ·
AWAY FROM HOUSE, PITCH SUPPLY ·
DOWN TO WITHIN 20 FT. OF GARAGE ·
AND BLEED INTO WET RETURN ·

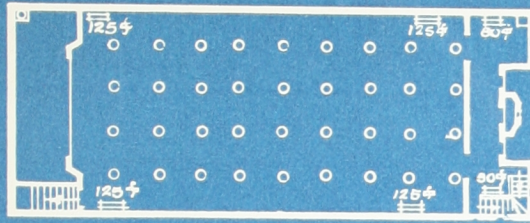
PLAN · NUMBER · TEN · A · GARAGE · BUILDING ·



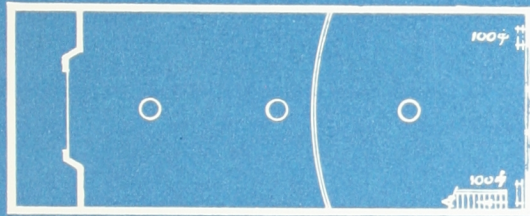
BASEMENT PLAN
... Scale: 1/8" = 1'0" ...



PLAN · NUMBER · ELEVEN · THEATRE · BUILDING ·



FIRST FLOOR
...Scale: 1/32" = 1'0"...



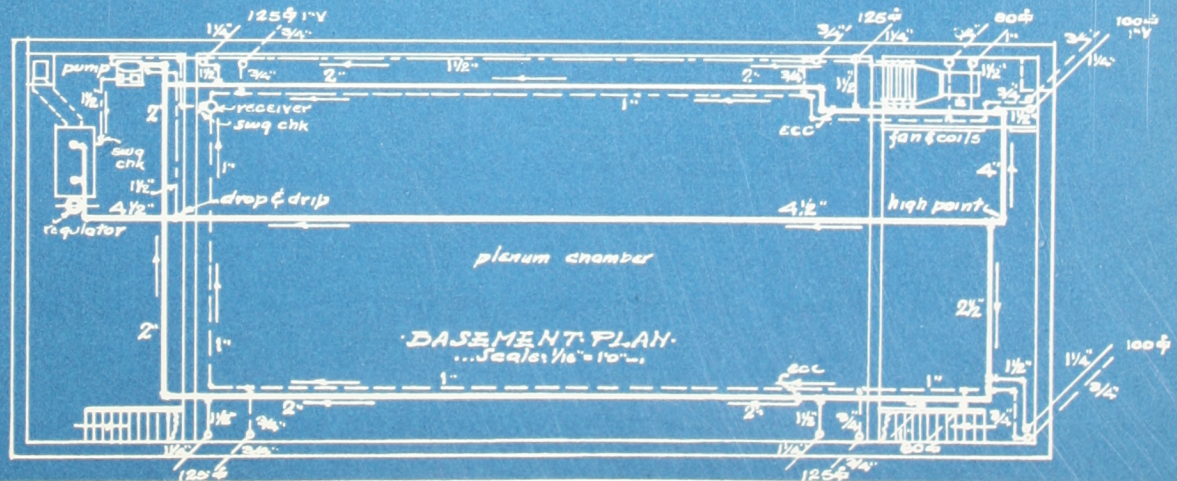
BALCONY
...Scale: 1/32" = 1'0"...



FRONT ELEVATION
...Scale: 1/32" = 1'0"...

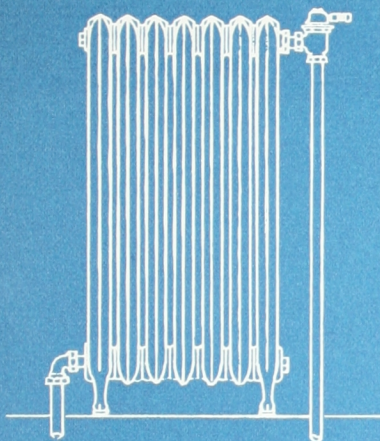


LONGITUDINAL SECTION

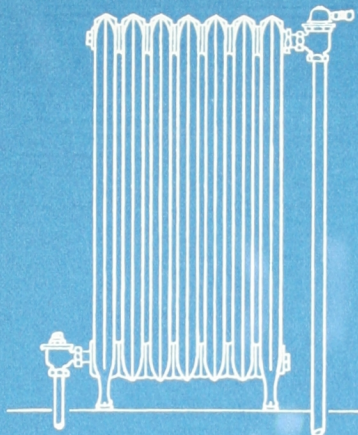


BASEMENT PLAN
...Scale: 1/16" = 1'0"...

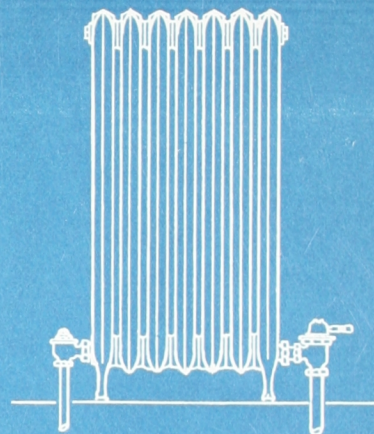
·TYPICAL·RADIATOR·CONNECTIONS·



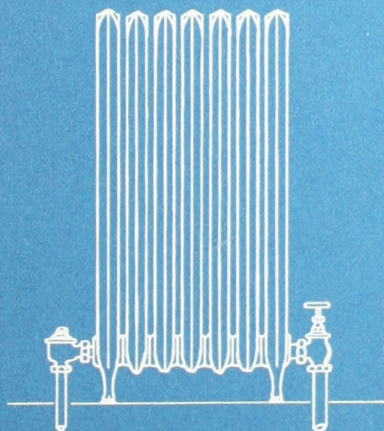
·STANDARD·VALVE·AND·RETURN·
·FITTING·CONNECTION·



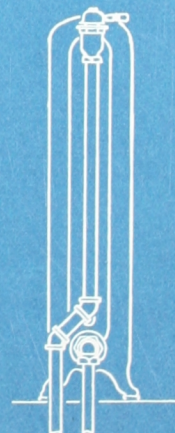
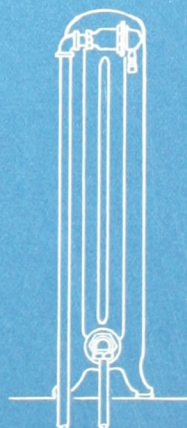
·STANDARD·VALVE·AND·THERMO·
·TRAP·CONNECTION·



·BOTTOM·CONNECTION·USED·IN·CHURCHES·
AND·SCHOOLS·OR·WHERE·HEAT·IS·INTERMITTANT·

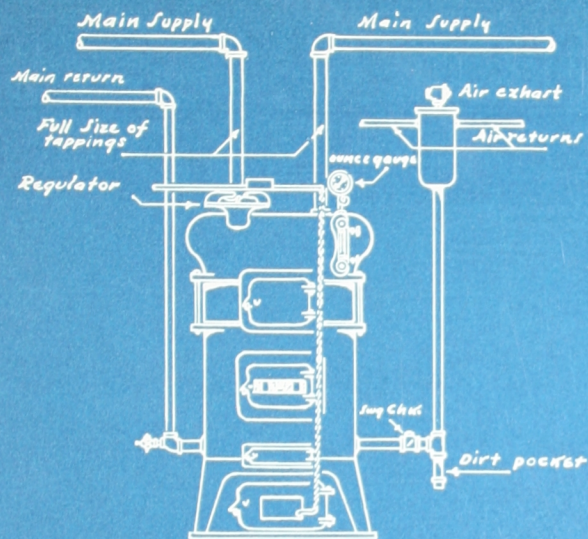


·CONNECTIONS·USED·FOR·REMODELLING·
·STRAIGHT·STEAM·INSTALLATION·



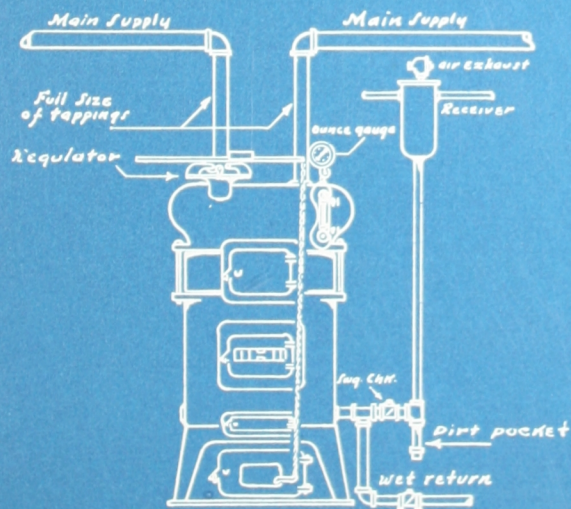
·TWO·METHODS·OF·CONNECTING·RADIATORS·FOR·
·SUPPLY·AND·RETURN·ON·SAME·END·

·DETAIL·OF·TYPICAL· ·BOILER·CONNECTIONS·I·

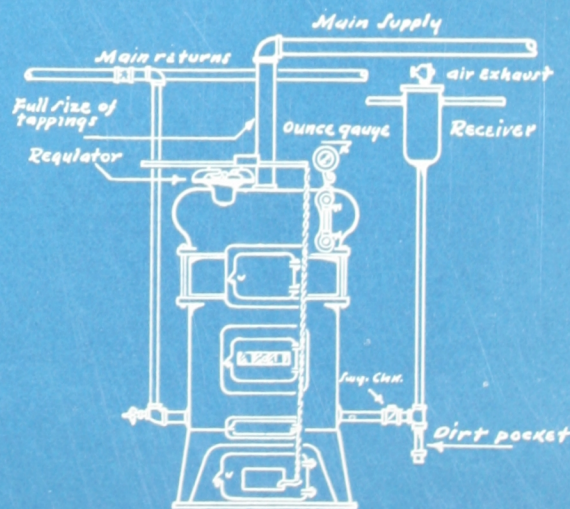


NO 1

CONNECTIONS FOR ROUND BOILERS
USED WITH A TRANE SYSTEM

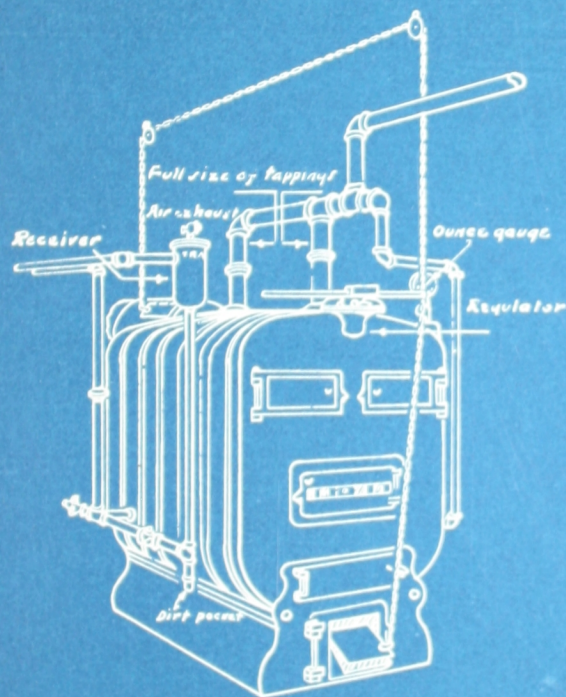


NO 2



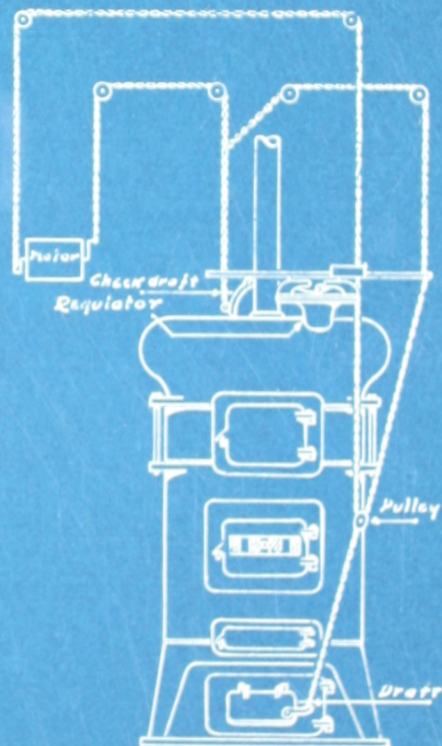
NO 3

· DETAIL · OF · TYPICAL · · BOILER · CONNECTIONS · II ·



NO 4

· TYPICAL · CONNECTIONS · FOR ·
· SQUARE · BOILER ·



NO 5

THERMOSTAT CONNECTIONS

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